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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/003,240	10/26/2001	Donald Danielson	884.614US1	4515

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EXAMINER

MACKEY, TERRENCE M

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 06/24/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/003,240

Applicant(s)

DANIELSON ET AL.

Examiner

Terrence Mackey

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 27 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 - 27 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other:

Detailed Action

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making an using it, in such full, clear, concise, and exact terms as to enable any person skill in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 – 27 are rejected under 35 U.S.C. 112, first paragraph, as lacking enablement in understanding what is mean by “refractory metals for metal first layer 26 include scandium, yttrium, lanthanum, and cerium and the like” on page 4 of the specification. The Examiner is unaware of any source that includes these metals as refractory metals, with the available sources generally citing the Group 4A, 5A, and 6A metals of the Periodic Table as the refractory metals. Since there is no recognition of these metals as being refractory metals one of ordinary skill in the art would not know what “and the like” means.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 – 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite as it is unclear what is meant by the phrase “refractory metal”. It is noted that on page 4 of the specification applicant states “refractory metals for metal first layer 26 include scandium, yttrium, lanthanum, and cerium and the like”. The Examiner is unaware of any source that includes these metals as refractory metals, with the available sources generally citing the Group

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4A, 5A, and 6A metals of the Periodic Table as the refractory metals. Since there is no recognition of these metals as being refractory metals one of ordinary skill in the art would not know what "and the like" means.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 – 27 are rejected under 35 U.S.C. 103(a) as being obvious over Grumbine et al. (6,136,711).

Applicant claims a composition and process for etching a ball-limiting metallurgy (BLM) stack comprising etching a BLM stack disposed over a metallization in the presence of a solution containing a nitrogen-containing heterocyclic compound, an ammonium hydroxide compound, an oxidizer, and a metal halide compound. Applicant also claims the nitrogen-containing heterocyclic compound being selected from pyrrole, imidazole, oxazole, thizole, pyrazole, 3-pyrroline, pyrrolidine, and n-methyl pyrrolidone. Applicant also claims the oxidizer being selected from ozone, hydrogen peroxide, and hydrogen peroxide-containing complexes. Applicant also claims conditions wherein the solution has a pH range from about 7 to about 12. Applicant additionally claims volume ratios for the components of the solution as well as an etching time and temperature.

Grumbine et al. (6,136,711) disclose a composition capable of etching tungsten as well as methods for using the composition for etching tungsten-containing substrates. The tungsten-containing substrates may be various substrates associated with integrated circuits and furthermore the tungsten layer may be part of a stack including titanium and titanium nitride (column 3, lines 49- 62). The etch composition of Grumbine et al. includes an oxidizer, an inhibitor for tungsten etching, and optionally at least one catalyst. The preferred oxidizing agents are hydrogen peroxide and it's adducts (column 5, lines 18-20). Classes of compounds that inhibit tungsten etching include compounds having nitrogen containing functional groups such as nitrogen containing heterocycles such as acetyl pyrrole, alkyl ammonium ions, amino alkyls, and amino acids (column 5, lines 31-44). Tetramethylammonium hydroxide is cited as an example of an alkyl ammonium ion (column 5, line 53 through column 6, line 2). The catalyst may be metallic or nonmetallic or a combination thereof, with iron (II or III) fluorides given as an example (column 6, lines 25-37). Table 4 shows that the compounds including the nitrogen containing functional groups are able to inhibit tungsten etching to pHs at least as high as 7.0.

It is the position of the Examiner that the volume ratios of the components of the etch solution would be selected by one of ordinary skill in the art to achieve a desired etch rate and selectivity between the metal layers. Varying the volume ratios of the components would be expected to achieve a result. It is furthermore the position of the Examiner that one of ordinary skill in the art of semiconductor manufacture would optimize the etching time and temperature in order to achieve an expected result.

Conclusion

Remaining references cited to show the state of the prior art.

No claim is allowed.

Papers relating to this application may be submitted to Technology Sector 1700 by facsimile transmission. Papers should be faxed to Crystal Plaza 3, Art Unit 1765, using fax number (703) 746-9519. All Technology Section 1700 fax machines are available to receive transmissions 24 hrs/day, 7 days/wk. Please note that the faxing of such papers must conform to the Notice published in the Official Gazette, 1096 OG 30, (November 15, 1989).

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Terrence Mackey whose telephone number is (703) 305-5504. The Examiner can normally be reached Monday - Friday from 7:00 AM - 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the examiner's supervisor, Ben Uteck, can be reached at (703) 308-3836.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0661.



ROBERT KUNEMUND
PRIMARY EXAMINER

TMM

June 12, 2003